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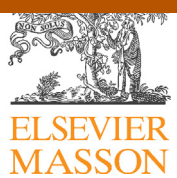

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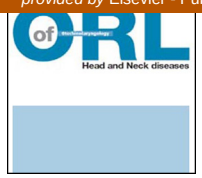

ORIGINAL ARTICLE

Sialendoscopy: A new diagnostic and therapeutic tool

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KEYWORDS
Sialendoscopy;
Learning curve;
Sialolithiasis;
Stenosis

Summary
Background: Sialendoscopy is a recently developed minimally invasive diagnostic and therapeutic procedure for the management of obstructive diseases of the salivary glands. This report describes our early experience with this new tool and compares our results with the literature data.
Material and methods: This was a retrospective analysis of the 33 first cases treated at a teaching hospital from October 2009 to June 2011.
Results: The success rate for diagnostic sialendoscopy was 94%. Sialolithiasis was found in 19 cases and salivary duct stenosis in 11; no canal anomaly was found in two cases. The success rate for stone removal was 79%, while treatment of strictures failed in four cases. Longer surgical experience led to shorter operating times and improved indications as well as better therapeutic outcomes. There were no complications.
Conclusion: Sialendoscopy is a safe technique that can easily be learned by surgeons familiar with endoscopic surgery. However, practical experience is needed to reduce operating times, lower failure rates and determine its precise indications.

Introduction

Sialendoscopy is a recently developed technique allowing diagnosis and treatment during the same procedure. Several studies have demonstrated its safety and usefulness [1,2]. Described for the first time in the early 1990s by Katz [3], sialendoscopy uses semi-rigid or rigid miniaturized endoscopes with optical fibers providing high-quality images to explore the parotid and submaxillary salivary ducts. For diagnostic purposes, sialendoscopy is superior to imaging for obstructive pathologies [4]. The radiolucent stones, stenosis, polyps, mucosal plugs and foreign bodies often missed by imaging methods, can be visualized by this technique.

When used for therapeutic purposes, sialendoscopy is a minimally invasive and non-traumatic surgical technique enabling endoscopic stone removal, stricture dilatation and salivary gland lavage. In most cases, submaxillectomy can be avoided with its risk of injury to the hypoglossal nerve, lingual nerve, marginal mandibular branch of the facial nerve, as can parotidectomy with its risk of injury to the facial nerve. This conservative attitude is possible because gland function remains satisfactory after sialendoscopy for obstructive disease [5].

The only contraindication reported in the literature is acute salivary gland infection due to the increased risk of perforation of inflammatory ducts [1,6].

The purpose of the present study was to describe the implementation of this new technique in our initial cohort

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of patients and to report the difficulties encountered. This retrospective study included the first 33 patients who underwent sialendoscopic surgery in the otorhinolaryngology and head and neck surgery department of the Rouen University Hospital.

Materials and methods

Materials

The analysis involved the first 33 consecutive patients who underwent sialendoscopy from October 1, 2009, when the technique was first used in the department, to June 30, 2011. There were 16 men and 17 women, mean age 44 years (range 11—83). Parotid glands were explored in 15 patients and submaxillary glands in 18. One surgeon, who had trained with an experienced colleague on the first two patients, performed most of the procedures (27 out of 33). Another surgeon with 6 months of training at another specialized center performed one procedure, while two surgeons trained in the department performed four and one procedures, respectively.

Indications for sialendoscopy were mainly acute conditions (swelling, pain). There were also a few cases of chronic inflammation affecting the parotid or submaxillary glands, and several cases seen late after acute infection of a salivary gland with an imaging diagnosis of lithiasis.

Preoperative imaging included ultrasound, computed tomography and, on rare occasions, sialography in all patients. Postoperative efficacy of the therapeutic procedure was based on the resolution of pain and/or swelling. In cases of doubt over complete stone extraction, a repeat ultrasound of the salivary glands was performed. Postoperative treatment included analgesics, mouthwashes and antibiotics and corticosteroids as necessary, depending on the inflammatory state of the ductal system as assessed intraoperatively.

The following data were collected for each patient: age; gender; indication; imaging findings; date and duration of the procedure; diagnosis; treatment; problems encountered; and outcome and complications.

Three sialendoscopes were used: a Marchal all-in-one sialendoscope; and two miniaturized sialendoscopes with outer sheaths. Additional instruments were dilatation probes, a Dormia basket, grasping forceps and a dilatation balloon (Fig. 1).

Technique

All procedures were performed in the operating room under general anesthesia for better operative comfort. The same technique was used for both the submaxillary and parotid glands in spite of the difference in duct diameter (on average, 3 mm and 2 mm, respectively) [7]. With the patient in supine position, a mouth prop was inserted on the side opposite to the gland explored, and a cheek retractor was used to explore the submaxillary gland.

Once identified, the orifice of the duct was progressively dilated with dilatation probes (sizes 0000, 000 and 00) to match the diameter of the endoscope (6 mm); dilatation was completed with a conic dilator if necessary. For Wharton's duct, the papilla was lifted from the frenulum with dissecting forceps; for Stenon's canal, the cheek was retracted anteriorly to pass the curvature above the masseter muscle.

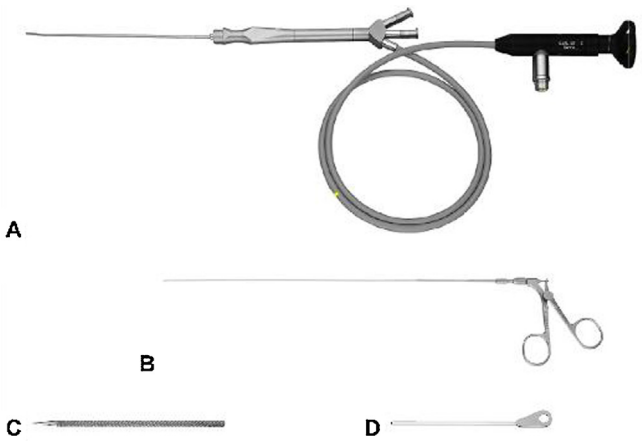

Figure 1 Sialendoscopy instruments. A. All-in-one sialendoscope. B. Grasping forceps. C. Dilator. D. Dilating probe.

The endoscope was introduced within a fine diagnostic sheath with an operator channel connected to a foot-controlled automatic irrigation system to dilate and wash out the gland. The ductal system was explored as far as the third division.

If an anomaly was encountered, the diagnostic sheath was replaced by a therapeutic sheath with two operator channels, one connected to the irrigation system and the other for instruments. Lithiases (Fig. 2) were removed with a Dormia basket or grasping forceps. Strictures (Fig. 3) within the main duct were dilated with dilatation probes, while those within the duct ramifications were dilated with a balloon probe.

At the end of the procedure, the entire ductal system was reexamined. A 0.75 mm diameter catheter was then inserted to prevent retractile strictures during the healing process.

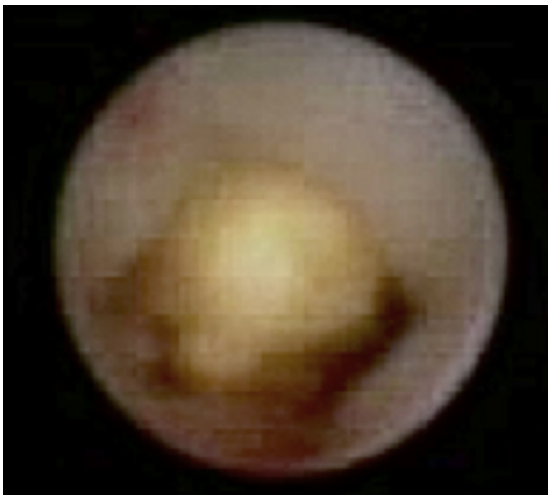

Figure 2 Sialendoscopic view of a stone in Wharton's duct.

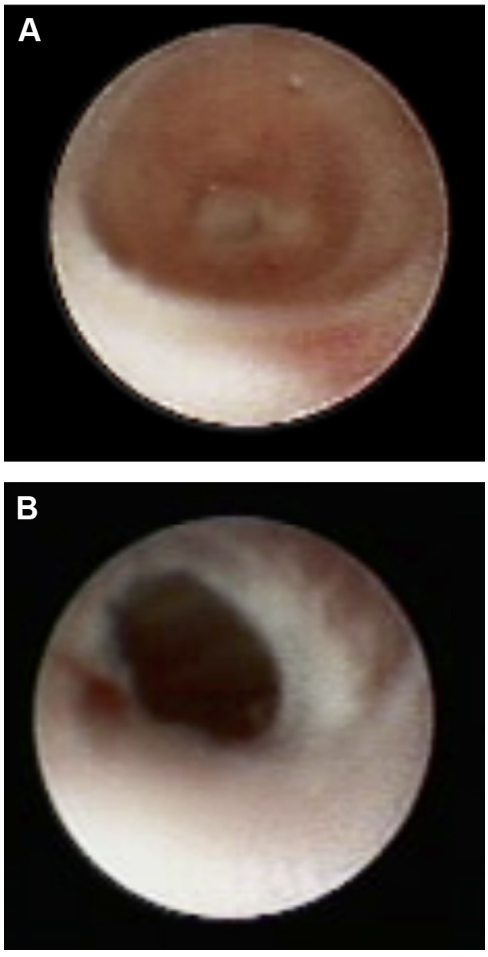

Figure 3 Sialendoscopic view before (A) and after (B) dilatation of a stricture in Wharton's duct.

Results

The mean operating time was 56 min (range: 20—160 min), and its duration declined according to the amount of experience of the surgeon (Fig. 4).

Sialendoscopy provided a diagnosis in 32 of the 33 patients (97%). Submaxillectomy was performed in one patient due to the difficulties encountered while entering and navigating Wharton's duct. This was the first operation performed by one of the surgeons alone.

Stones were found in 19 (11 submaxillary, eight parotid) of 32 glands (59%). Sixteen glands had one stone, and three glands (one submaxillary, two parotid) had several stones each. On preoperative imaging, stone sizes were 4—20 mm in the submaxillary glands and 2—10 mm in the parotids. However, because some stones were friable, their size was not always measured intraoperatively.

Duct stricture (Fig. 4) was diagnosed in 11 (five submaxillary, six parotid) of 32 glands (34%), including one in Stenon's duct related to a cheek wound scheduled for venous plasty, whereas sialendoscopy was considered normal in two patients (6%) (one submaxillary, one parotid).

A therapeutic procedure was performed in 30 of the 33 patients. For the sialolithiasis cases, stone removal with a Dormia basket or grasping forceps was successful in 15 of 19 patients (79%). In one patient, an endobuccal incision was made to remove a large stone measuring 1 cm in diameter. Stone removal was uneventful in the one pediatric case (an 11-year-old), but was unsuccessful in four others due to stone size (> 1 cm) and distal or sometimes sequestered position in the submaxillary glands. Submaxillectomy was planned preoperatively for two patients and was necessary as a secondary procedure in two others (Fig. 5).

The operative result was variable among the 11 patients with duct stenosis treated by balloon or probe dilatation. Improvement was achieved in five cases, including total cure in two and partial cure in three. Dilatation of Wharton's duct failed in three cases and required secondary submaxillectomy in one case (involving a history of radiation therapy for piriform sinus cancer with recurrence at 1 month). Dilatation of Stenon's canal was unsuccessful in one case of multiple recurrent sialolithiasis despite two dilatations and duct derivation and, thus, parotidectomy was proposed. This same patient also underwent partially successful dilatation of the contralateral Stenon's canal. The immunological workup was negative. There was also one

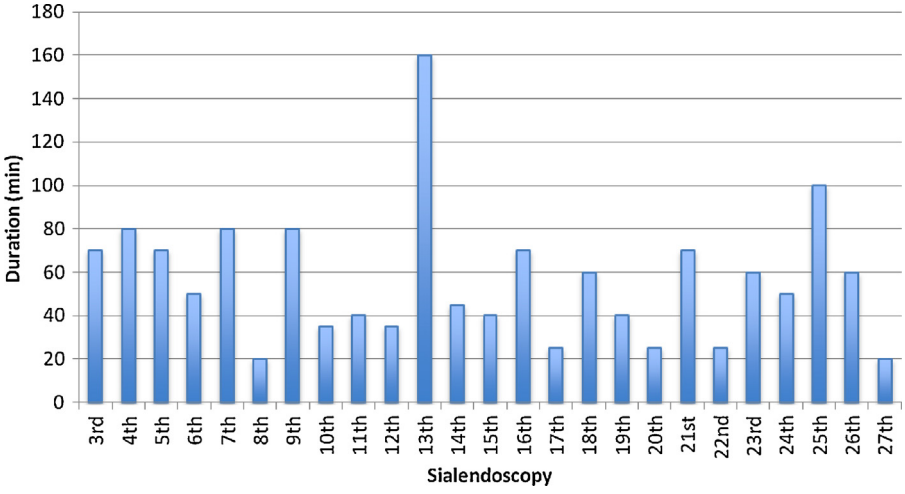

Figure 4 Durations of sialendoscopic procedures according to the order in which they were performed (from 3rd to 27th) by one surgeon.

Figure 5 Submaxillectomy involving a 1-cm stone in the submaxillary gland.

case of Stenon stricture related to a cheek wound scheduled for venous plasty, while another patient was still awaiting postoperative consultation.

Thus, of the 33 patients included in the study, 28 were cases of evaluable therapeutic sialendoscopy. Of these, the procedure was normal for two patients, could not be performed in one case, was not evaluated postoperatively in another and was a purely diagnostic intervention (stricture by cheek wound) in a further patient. The therapeutic procedure was unsuccessful in eight of 28 patients (28.5%), and involved the submaxillary gland in seven cases and the parotid gland in one case. Submaxillectomy was performed in seven patients, two at the time of the operation and five during a second procedure. Parotidectomy was proposed in one patient after dilatation had failed for several recurrent stenosis in Stenon's canal.

Postoperative outcomes: complete symptomatic relief was achieved in 20 of the 28 patients (71.5%). Two patients required a second sialendoscopy for recurrent lithiasis 7—8 months later. One patient underwent three sialendoscopic procedures within a 4-month period for removal of seven stones in total. Improvement was partial in four patients who had minor obstructive symptoms controlled by medication. Excluding the first procedure performed by each operator, the success rate was 83% (20 out of 24 procedures).

Discussion

Sialendoscopy is a diagnostic and therapeutic technique [8] that has recently been developed in several centers in Europe and around the world.

In comparison to the series reported in the literature, our initial cohort had several specific characteristics. The proportion of obstructive pathologies affecting the parotid gland (45%) compared with the submaxillary gland (55%) was higher than that described by Nahlieli et al. [1] in a series of 1078 salivary glands: parotid ($n = 347$, 32%); submaxillary ($n = 722$, 67%); and sublingual ($n = 9$, 1%). However, the mean age in the present series was consistent with data in the literature [1,9—11], although the reported gender ratios have been variable [1,9—12].

The success rate for diagnostic sialendoscopy has ranged from 96% to 98%, as reported by Nahlieli and Baruchin [12] and Marchal et al. [6], and was comparable to the success rate in the present series (97%). The one unsuccessful procedure was the first sialendoscopy performed by the surgeon who encountered difficulties while inserting the endoscope and navigating the duct.

Sialolithiasis was the main cause of obstruction (59%). Stricture was found in 39% of cases. There were no cases of duct inflammation, and no polyps or foreign bodies were observed. In the literature, the rates were around 80% for lithiasis and 10—20% for strictures [1,13].

The success rate for stone removal was 79%. Failure occurred in cases with large (> 1 cm) stones that were situated distally and sometimes entrapped within the gland. However, these failures were probably due to poor indications rather than problems with the technique. Mechanical fragmentation was insufficient to allow extraction, and lithotripsy or optical fiber laser fragmentation, as initially described by Gundlach et al. [14], was not available. According to reports in the literature [13,15—17], entrapped stones or those measuring greater than 4 mm should be fragmented prior to removal. Stones measuring greater than 8 mm require a combined endoscopic and transcutaneous approach. In the present series, sialendoscopy preserved the salivary gland in 79% of cases. In the series reported by Lari et al. [15], the indications for gland resection were reduced to 5%.

The success rate for dilatation was 55%. Strictures recurred in about half the cases despite duct catheterization. This led to submaxillectomy and, in one case, a proposed parotidectomy. Nahlieli et al. [1] reported an 81% success rate using the same operative technique.

Several studies have shown that sialendoscopy is a safe technique. In our present series, there were no cases of hemorrhage, nerve damage (facial or lingual nerve), infections or major duct perforation, such as reported by Marchal and Dulguerov [2] in a series of 450 sialendoscopies. There were, nevertheless, a few cases of minor perforation. The mean operating time decreased with experience, as reported by Luers et al. [18].

An analysis of the unsuccessful procedures revealed that, when a surgeon operated alone for the first time, the procedure was a failure and required secondary submaxillectomy. However, the failure rate again declined with experience.

The present series of 33 cases of sialendoscopy performed by different surgeons has illustrated the learning curve necessary for any new operative technique. Luers et al. [18] found that a surgeon had to perform the operation in 30 patients before achieving satisfactory operating times and success rates, which is close to the number of patients treated by the main operator in the present series.

Conclusion

Sialendoscopy is a new diagnostic and therapeutic technique that can easily be learned by surgeons experienced in

endoscopic procedures. Greater experience leads to shorter operating times, a smaller number of failures and better indications.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References

[1] Nahlieli O, Nakar LH, Nazarian Y, et al. Sialoendoscopy: a new approach to salivary gland obstructive pathology. J Am Dent Assoc 2006;137(10):1394—400.

[2] Marchal F, Dulguerov P. Sialolithiasis management: the state of the art. Arch Otolaryngol Head Neck Surg 2003;129(9):951—6.

[3] Katz P. Endoscopy of the salivary glands. Ann Radiol (Paris) 1991;34:110—3.

[4] Wolfensberger M. ORLet chirurgie cervico-faciale: l'endoscope à la conquête des glandes salivaires. Forum Med Suisse 2003;51/52:1269—72.

[5] Su YX, Xu JH, Liao GQ, et al. Salivary gland functional recovery after sialendoscopy. Laryngoscope 2009;119(4):646—52.

[6] Marchal F, Dulguerov P, Becker M, et al. Specificity of parotid sialendoscopy. Laryngoscope 2001;111(2):264—71.

[7] Zenk J, Hosenmann WG, Iro H. Diameters of the main extretory ducts of adult human submandibular and parotid gland: a histologic study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998;85:576—80.

[8] Marchal F, Dulguerov P, Lehmann W. Interventional sialendoscopy. N Engl J Med 1999;341:1242—3.

[9] Walvekar RR, Razfar A, Carrau RL, et al. Sialendoscopy and associated complications: a preliminary experience. Laryngoscope 2008;118(5):776—9.

[10] Bowen MA, Tauzin M, Kluka EA, et al. Diagnostic and interventional sialendoscopy: a preliminary experience. Laryngoscope 2011;121(2):299—303.

[11] Serbetci E, Sengor GA. Sialendoscopy: experience with the first 60 glands in Turkey and a literature review. Ann Otol Rhinol Laryngol 2010;119(3):155—64.

[12] Nahlieli O, Baruchin AM. Sialendoscopy: three years' experience as a diagnostic and treatment modality. J Oral Maxillofac Surg 1997;55:912—8.

[13] Faure F, Boem A, Taffin C, et al. Sialendoscopie diagnostique et interventionnelle. Rev Stomatol Chir Maxillofac 2005;106(4):250—2.

[14] Gundlach P, Scherer H, Hopf J, et al. Die endoskopisch kontrollierte Laserlithotripsie von Speichelsteinen: in vitro Untersuchungen und erster klinischer Einsatz. HNO 1990;38: 247—50.

[15] Lari N, Chossegros C, Thiery G, et al. Sialendoscopie des glandes salivaires. Rev Stomatol Chir Maxillofac 2008;109(3):143—7.

[16] Koch M, Bozzato A, Iro H, et al. Combined endoscopic and transcutaneous approach for parotid gland sialolithiasis: indications, technique, and results. Otolaryngol Head Neck Surg 2010;142(1):98—103.

[17] Marchal F. A combined endoscopic and external approach for extraction of large stones with preservation of parotid and submandibular glands. Laryngoscope 2007;117(2):373—7.

[18] Luers JC, Damm M, Klussmann JP, et al. The learning curve of sialendoscopy with modular sialendoscopes: a single surgeon's experience. Arch Otolaryngol Head Neck Surg 2010;136(8):762—5.